

Will SARS-CoV-2 prevention efforts affect the coming influenza season in the United States and northern hemisphere?

James L. Hadler, MD, MPH[§]

[§]Corresponding author:

James L. Hadler, MD, MPH

Clinical Professor of Epidemiology and Public Health

Emerging Infections Program

Yale School of Public Health

Accepted Manuscript

Studies have examined the effects of community-wide non-pharmaceutical interventions (NPIs) on the influenza pandemic of 1918-20, and speculated on the effect of deploying them in a modern pandemic [1]. The initial country-level responses to SARS-CoV-2 have provided substantial evidence of their collective impact on the COVID-19 pandemic and, incidentally, on seasonal influenza epidemics.

In this issue of *the Journal of Infectious Diseases*, Lei et al present an analysis of the impact of China's "lockdown" response to COVID-19 on influenza as measured by China's outpatient hospital-based sentinel surveillance system during the anticipated peak of the influenza season in late January 2020 [2]. The Chinese national influenza surveillance system includes collection of number of visits, number that were for influenza-like illness (ILI), number of influenza laboratory tests and test results from 554 hospitals scattered around China. The system is large, including up to 4 million visits and 10-25,000 laboratory tests for influenza each week during the peak winter influenza season. Outcomes presented in graphic form by week from October 2019 – mid-May 2020 include total number of visits, percentage ILI, total number of tests for influenza, percentage positive, and estimated influenza rate among those with hospital visits (number of ILI visits times percentage of flu tests positive for influenza). There were several very important findings. Prior to implementation of NPI nationally, the 2019-20 influenza season was not substantially different from the two preceding seasons except that the number of samples tested for influenza was substantially higher in the month before NPI implementation (late December – late January), the positivity rate was lower, and the estimated influenza rate was lower one week before. Following NPI implementation compared to previous seasons, the number of visits decreased dramatically over the next two weeks, the percentage for ILI increased, the percentage positive for influenza decreased and the influenza incidence rate began plummeting, reaching nearly undetectable levels within 5 weeks and remaining so through the mid-May mark when the

data presented in the analysis ended. The authors concluded that the marked decline in influenza they documented was associated in time with the implementation of NPI, suggesting that the NPIs implemented had collateral benefit in preventing influenza.

The findings from China are particularly important. As a country, it has perhaps the largest influenza sentinel surveillance system in the world, including active testing for influenza, and it was the first country to implement highly successful NPIs against SARS-CoV-2, giving it the best opportunity to see a possible change in influenza before the expected seasonal decline. Second, the outcomes of percentage influenza tests positive and calculated influenza rate per hospital visit are optimal outpatient outcomes to use, given changing dynamics in hospital visits brought about by NPIs and a sharp decline in all outpatient hospital visits. However, China's response to COVID-19 was the most comprehensive and effective of any large country. It consisted of stopping all travel within the country, closing all schools, entertainment venues and non-essential work, eliminating public gatherings, isolating outside the home all documented cases and persons needing quarantine in special facilities, conducting massive fever screening, using artificial intelligence to detect movement and contacts, and mandating and enforcing universal face-mask use in public places, among other things. The bottom line is that if you can virtually eliminate COVID-19, you can eliminate influenza transmission using the same strategy. In other northern hemisphere countries with less stringent, but still largely effective, measures to control COVID-19, influenza activity also appeared to decline rapidly, shortening the expected spring 2020 influenza season by as much as six weeks [3,4].

To know what might happen with influenza this coming fall and winter, we need to know what has happened prospectively in southern hemisphere countries, especially those that like the US have used fewer NPI's and used them with less rigor and, correspondingly, been less successful in controlling SARS-CoV-2 transmission. The one comprehensive source of data

thus far is the World Health Organization's (WHO) most recent influenza update [5]. Remarkably, there has been so little influenza activity throughout the southern hemisphere that the August 17 report, covering the usual time period of peak activity in the southern hemisphere (June-August) stated "In the temperate zones of the southern hemisphere, the influenza season has not commenced. Despite continued or even increased testing for influenza in some countries in the southern hemisphere, very few influenza detections were reported." [5] Overall, during the last two weeks of July, only 40 influenza isolates were made in laboratories in the Global Influenza Surveillance and Response System (GISRS) laboratories when in 2019, there were 3,660, with only one fifth as many tests, during the same time period [6]. In Australia, where most schools have been open during their winter, there were few positive laboratory tests and just two hospitalizations with laboratory confirmed influenza in sentinel hospitals between June 1 and August 23 [7].

The above experience does not mean that there will be no distinct 2020-2021 seasonal influenza epidemic in northern hemisphere countries. Among the NPI factors that have been successful at controlling COVID-19 incidence that will likely play a role in the shape of the coming influenza season in each country are travel, both international and domestic; and the extent to which each country opens up and relaxes community social distancing, including opening childcare, schools and workplaces; allows large gatherings, open bars and indoor dining, abandons individual social distancing and use of face masks and, importantly, pays less attention to symptom and temperature screening and encouraging those with symptoms to stay home. If influenza is repeatedly introduced through travel, it may have the opportunity to spread widely if community COVID-19 prevention measures are too relaxed. While we focus on every infection with SARS-CoV-2, we have not historically nor are we likely to pay as much attention to influenza infection. Testing for influenza will not be as rigorous, contact investigations followed by quarantine recommendations for contacts of

those testing positive are unlikely to be made, and those with mild symptoms who test negative for SARS-CoV-2 will be less likely to isolate. Countries that have opened the most after their coronavirus “lockdowns” including, ironically, those such as China that have had the most success at controlling SARS-CoV-2, are the ones with the highest potential to have a distinct seasonal epidemic and the largest related healthcare burden.

Despite the potential for a greatly diminished influenza season (SARS-CoV-2 is not going away, nor will the need diminish for social distancing efforts), vaccination against influenza remains important given the possibility of an influenza epidemic superimposed on the COVID-19 pandemic. It will be especially important for those who are most vulnerable to complications from influenza (young children, older adults, the elderly, those with high risk underlying medical conditions), and those in congregate settings that facilitate amplification of spread (e.g., schools, hospitals, correctional facilities, long term care facilities, crowded workplaces, homeless shelters) to get vaccinated, both for their personal benefit and to further reduce the potential for epidemic spread [8]. In this context and for this school year only, Massachusetts is requiring vaccination against influenza by December 31 of children attending Massachusetts child care, pre-school, kindergarten, K-12, and colleges and universities [9]. In the disease control context, Fall 2020 and Winter 2021 will be a challenging but fascinating time.

References

1. Markel H, Lipman HB, Navarro JA, et al. Nonpharmaceutical interventions implemented by US cities during the 1918-1919 influenza pandemic. *JAMA* 2007;298(6):644–654. doi:10.1001/jama.298.6.644
2. Lei H, Xu M, Wang X, Xie Y, Du X, Chen T, Yang L, Wang D and Shu Y: Non-pharmaceutical interventions used to control COVID-19 reduced seasonal influenza transmission in China. *J Infect Dis* 2020; xx:pp-pp.
3. Jones N: How coronavirus lockdowns stopped flu in its tracks. *Nature News*, May 21, 2020. doi: 10.1038/d41586-020-01538-8. Available at: <https://www.nature.com/articles/d41586-020-01538-8>. Accessed August 31, 2020.
4. WHO: Influenza update no. 368. May 25, 2020. Available at: https://www.who.int/influenza/surveillance_monitoring/updates/2020_05_25_surveillance_368.pdf. Accessed August 31, 2020.
5. WHO: Influenza update no. 374. August 17, 2020. Available at: https://www.who.int/influenza/surveillance_monitoring/updates/2020_08_17_surveillance_update_374.pdf. Accessed August 31, 2020.
6. WHO: Influenza update no. 348. August 19, 2019. Available at: https://www.who.int/influenza/surveillance_monitoring/updates/2019_08_19_surveillance_update_348.pdf?ua=1. Accessed September 1, 2020.
7. Australian Government Department of Health. Australian influenza surveillance report. 2020(10):1-13. Available at: [https://www1.health.gov.au/internet/main/publishing.nsf/Content/cda-surveil-ozflu-flucurr.htm/\\$File/flu-10-2020.pdf](https://www1.health.gov.au/internet/main/publishing.nsf/Content/cda-surveil-ozflu-flucurr.htm/$File/flu-10-2020.pdf). Accessed September 1, 2020.
8. Grohskopf LA, Alyanak E, Broder KR, et al. Prevention and Control of Seasonal Influenza with Vaccines: Recommendations of the Advisory Committee on

Immunization Practices — United States, 2020–21 Influenza Season. MMWR

Recomm Rep 2020;69(No. RR-8):1–24. DOI:

<http://dx.doi.org/10.15585/mmwr.rr6908a1>

9. Massachusetts Department of Public Health (press release): Flu vaccine now required for all Massachusetts school students enrolled in child care, pre-school, K-12, and post-secondary institutions. August 19, 2020. Available at:

<https://www.mass.gov/news/flu-vaccine-now-required-for-all-massachusetts-school-students-enrolled-in-child-care-pre>. Accessed September 1, 2020.

Accepted Manuscript

Footnote page

Conflicts of interest: no conflicts of interest

Funding: This work was supported in part by Cooperative Agreement 5 *NU50CK000488-04-00* from the Centers for Disease Control and Prevention (CDC). The opinions expressed are solely my own and do not necessarily represent the official views of the Yale School of Public Health or the CDC.

Previous presentations: none

Accepted Manuscript